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- (71) Applicants: CENTER OF GENOMIC TECHNOLOGIES, INSTITUTE OF GENETICS AND PLANT EXPERIMENTAL BIOLOGY ACADEMY OF SCIENCE OF UZBEKISTAN [UZ/UZ]; Yuqori Yuz, Qibray Region, 111226 Tashkent, Uzbekistan (UZ). THE UNITED STATES OF AMERICA, as represented by THE SECRETARY OF AGRICULTURE [US/US]; Washington, DC 20250 (US). THE TEXAS A & M UNIVERSITY SYSTEM [US/US]; 3369 Tamu, College Station, Texas 77843-3369 (US).
- (72) Inventors: ABDURAKHMONOV, Ibrokhim, Y; Yuqori Yuz, Qibray Region, 111226 Tashkent (UZ). BURIEV,

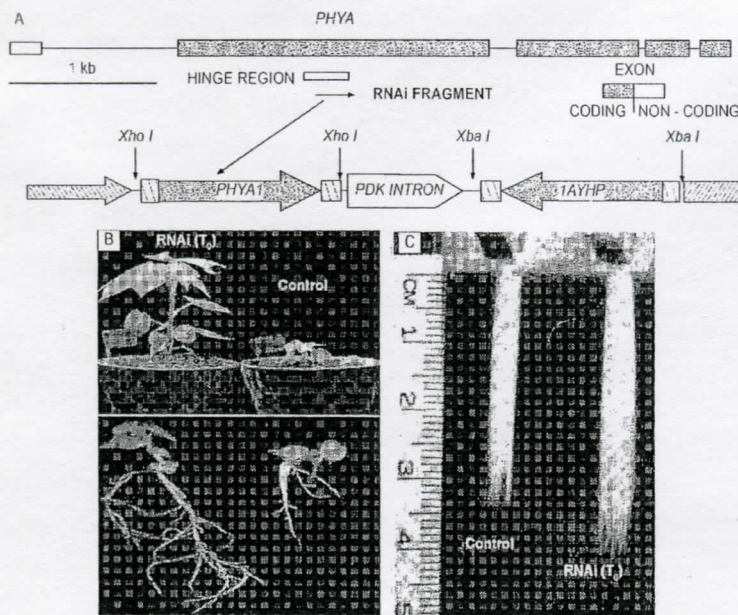
Zabardast, T.; Yuqori Yuz, Qibray Region, 111226 Tashkent (UZ). ABDUKARIMOV, Abdusattor; Yuqori Yuz, Qibray Region, 111226 Tashkent (UZ). JENKINS, Johnie Norton; USDA, ARS, Genetics & Precision, Agriculture, P.O. Box 5367, Highway 12E, Mississippi State, Mississippi 39762 (US). SAHA, Sukumar; USDA, ARS, Genetics & Precision, Agriculture, P.O. Box 5367, Highway 12E, Mississippi State, Mississippi 39762 (US). PEP-**PER, Alan, E.**; The Texas A & M University System, Department of Biology, College Station, Texas 77843 (US).

(74) Agent: **GOLDBERG, Joshua, B.**; Nath, Goldberg & Meyer, 112 S. West Street, Alexandria, Virginia 22314 (US).

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(54) Title: COTTON PHYA 1 RNAI IMPROVES FIBER QUALITY, ROOT ELONGATION, FLOWERING, MATURITY AND YIELD POTENTIAL IN GOSSYPIUM HIRSUTUM L.



(57) Abstract: Improvement of fiber quality of Upland cultivars (*Gossypium hirsutum*), while maintaining early maturity and productivity, is a fundamental problem in conventional cotton breeding. Phytochromes play a fundamental role in plant development, flowering and cotton fiber length. Targeted RNAi of PHYA 1 genes in cotton suppressed expression of PHYA 1 and/or PHYB, resulting in over-expression of the remaining PHY-A2/B/C/E genes. This altered expression induced a number of phytochrome-associated phenotypes, including increased root length and mass, increased anthocyanin-pigment, vigorous shoot development and vegetative growth, early flowering, early boll maturity, increased fiber length and increased seed cotton yield compared to control plants. These RNAi phenotypes were stably inherited and expressed through four generations (T₀₋₃) and were transferable from RNAi Coker-312 plants to Upland cultivars via conventional hybridization. These effects in Upland cotton breeding can offer a new paradigm in cotton breeding resulting in the development of productive, early-maturing Upland cultivars with

increased fiber length and fiber strength.

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